

Experience with Acid Rain and NOx Cap and Trade Programs

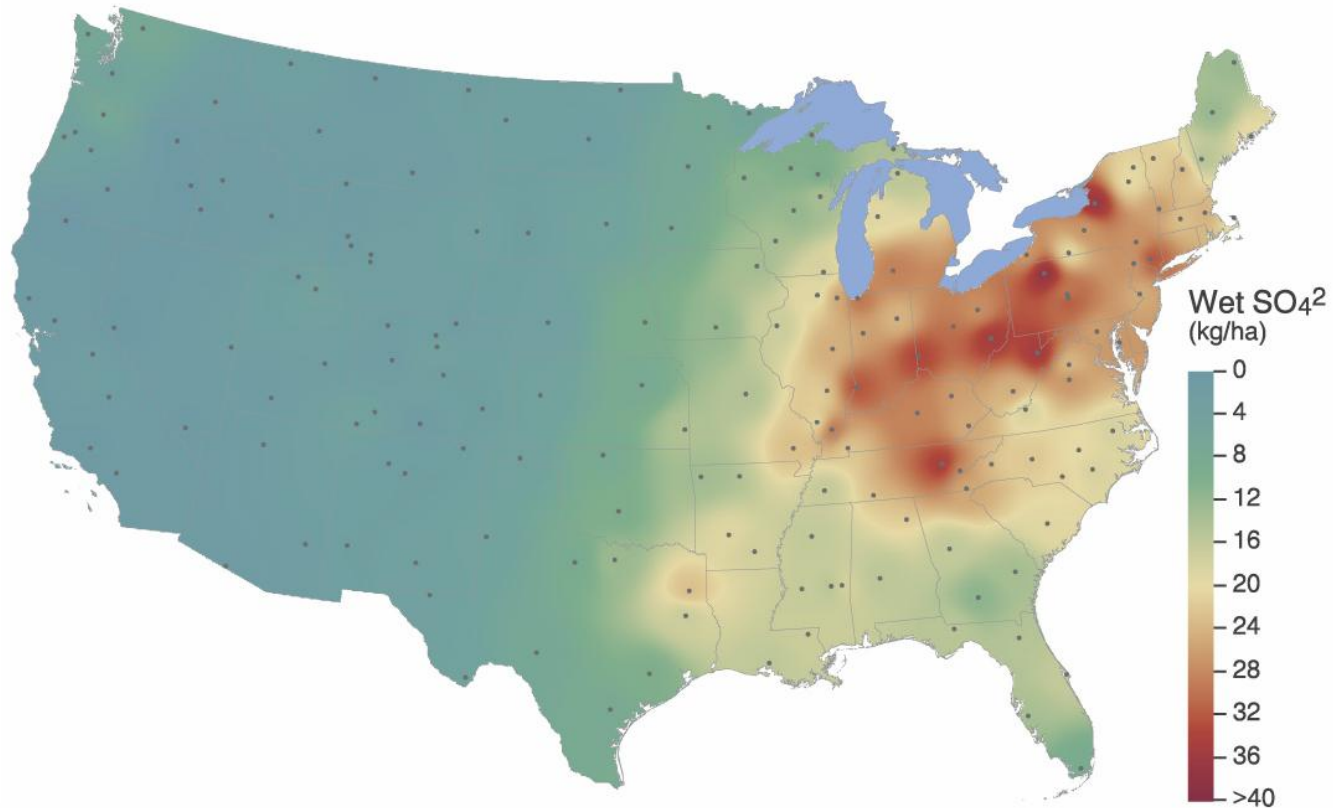
Brian McLean, Director
Office of Atmospheric Programs,
U.S. Environmental Protection Agency
January 8, 2008

Overview

- Cap and trade is one of several regulatory approaches
- If properly designed and applied, it can be
 - Environmentally effective and administratively efficient
 - Reduce emissions quickly and cost-effectively
 - Promote innovation
- Works best in situations where
 - Aggregate impact is principal concern
 - Costs differ across a range of options
 - Strong regulatory institutions and financial markets exist
- Can work in concert with other regulatory approaches

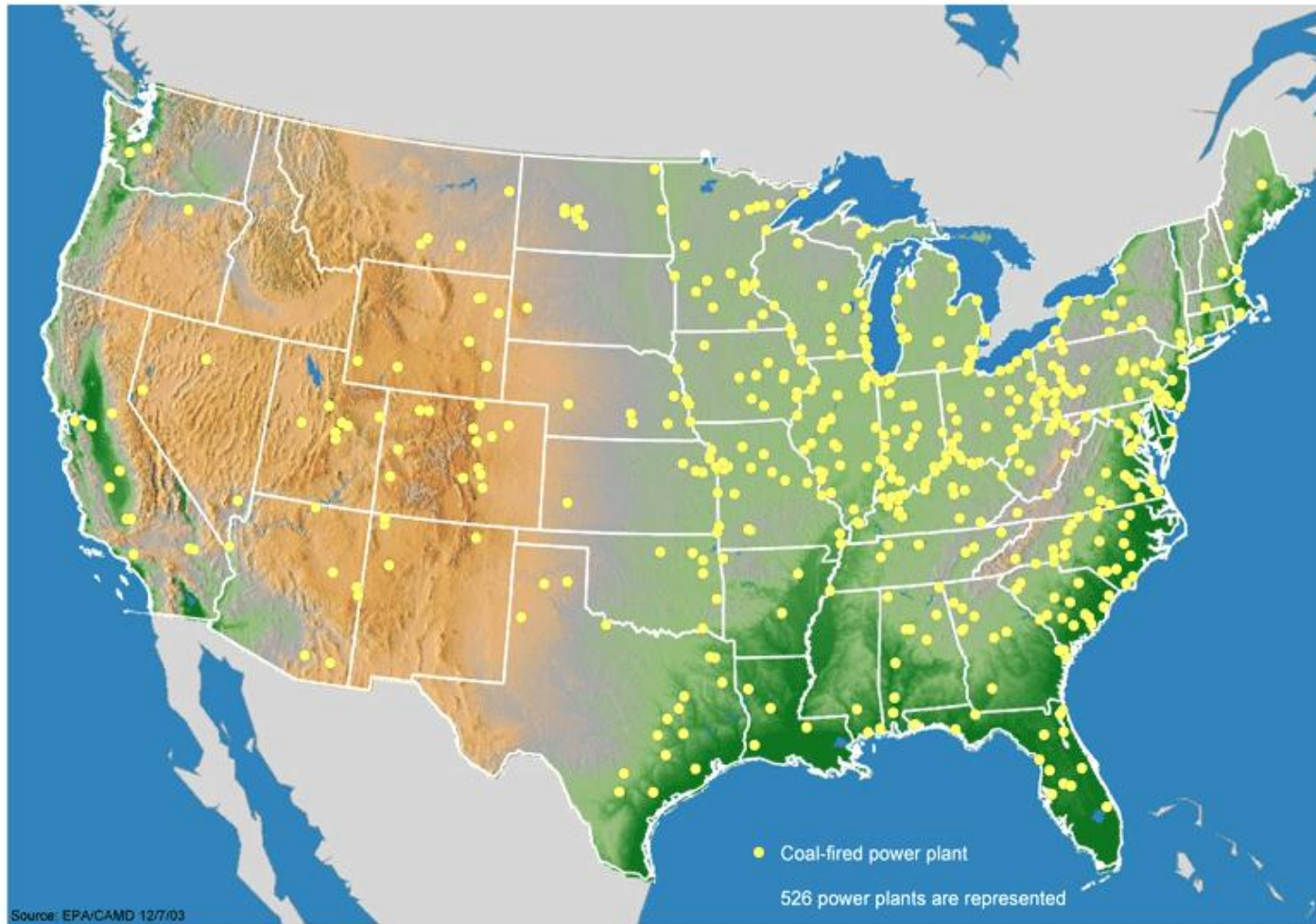
Addressing Acid Rain

Annual Mean Wet Sulfate Deposition,
1989–1991



Source: National Atmospheric Deposition Program

Coal-Fired Power Plants Are the Dominant Source of Air Emissions



U.S. Coal-Fired Power Plants

- There are about 530 power plants with 305 GW of capacity that consists of about 1,300 units.
- Coal plants generate the vast majority of power sector emissions:
 - 95% SO_2
 - 90% of NO_x
 - 83% of CO_2

Setting the Cap and Allocating Allowances: Acid Rain Program

- Legislation established
 - cap level
 - timing of reductions
 - allocations
- Allocation was not addressed until the cap was agreed upon
- Requests for additional allowances had to be balanced against losses of allowances

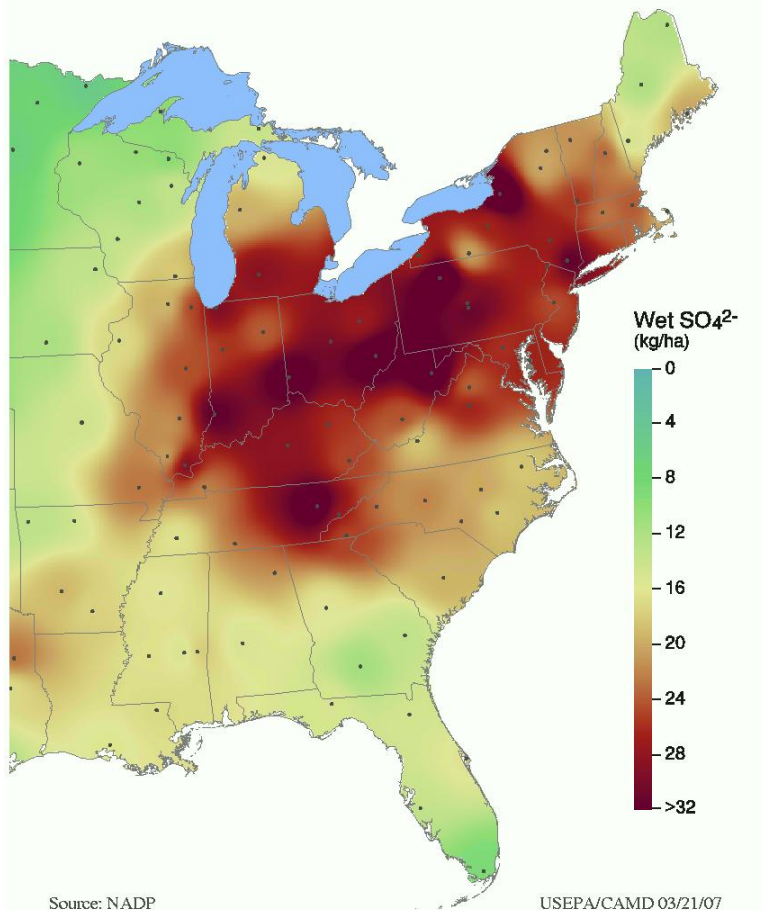
Distributing Allowances

- Considerations: Equity, environmental incentives, efficiency
- Recognition that vast majority of allocation approaches that EPA has considered all lead to the same level and distribution of emission reductions: the emission caps and banking drive reductions.
- Many ways, none are perfect:
 - Direct allocation to sources based on historical and/or current emissions, energy use (input), or production (output, e.g. MWH)
 - Set asides (new sources, renewables, demand side efficiency)
 - Auction and distribute revenues
 - Hybrid
- Allowance allocation should balance need for certainty and allow for changing circumstances
 - EPA programs have allocations for several years into the future

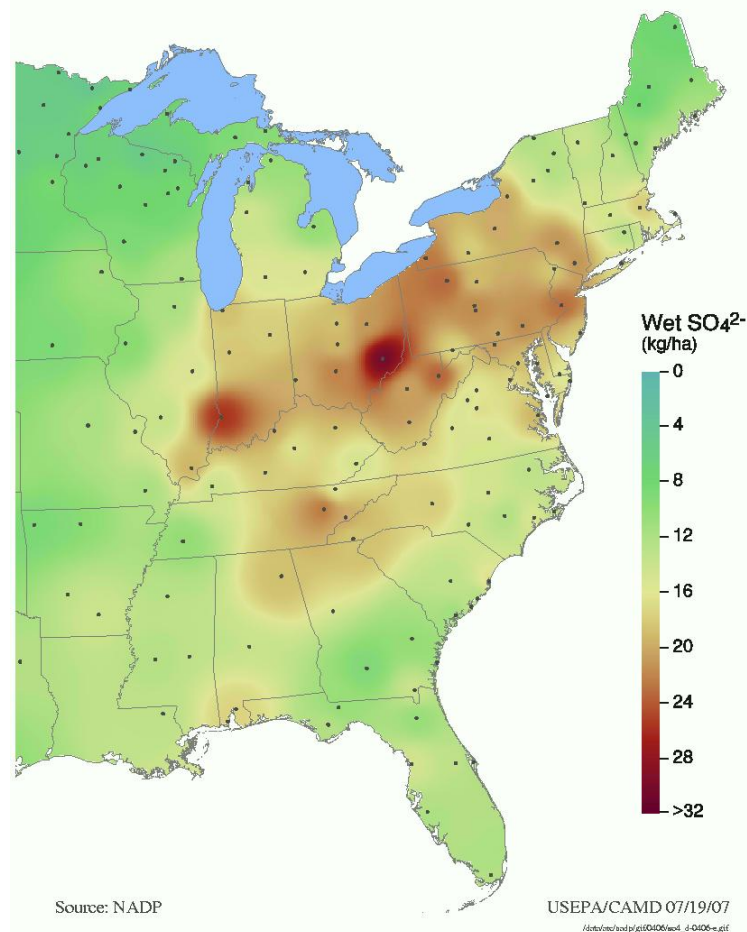
Acid Rain Program Progress

Annual Mean Wet Sulfate Deposition

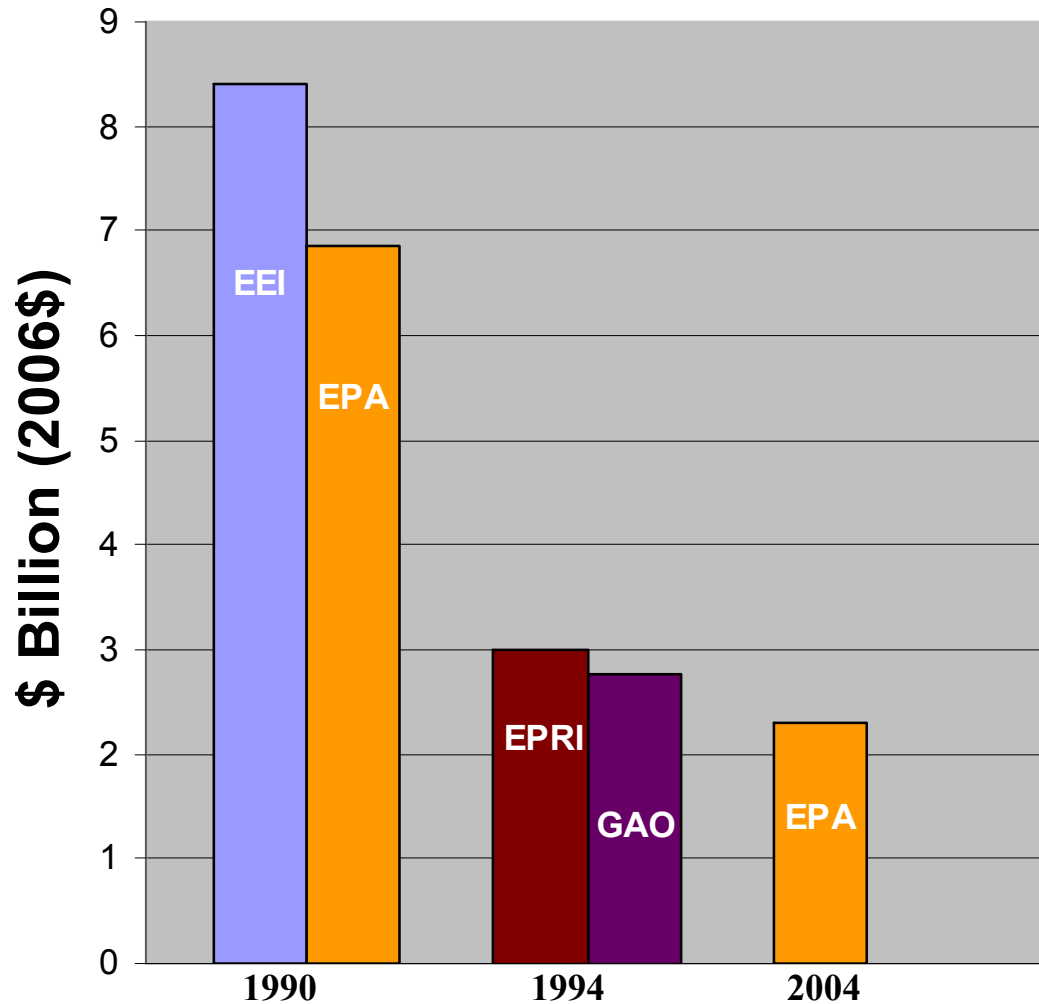
1989-1991



2004-2006



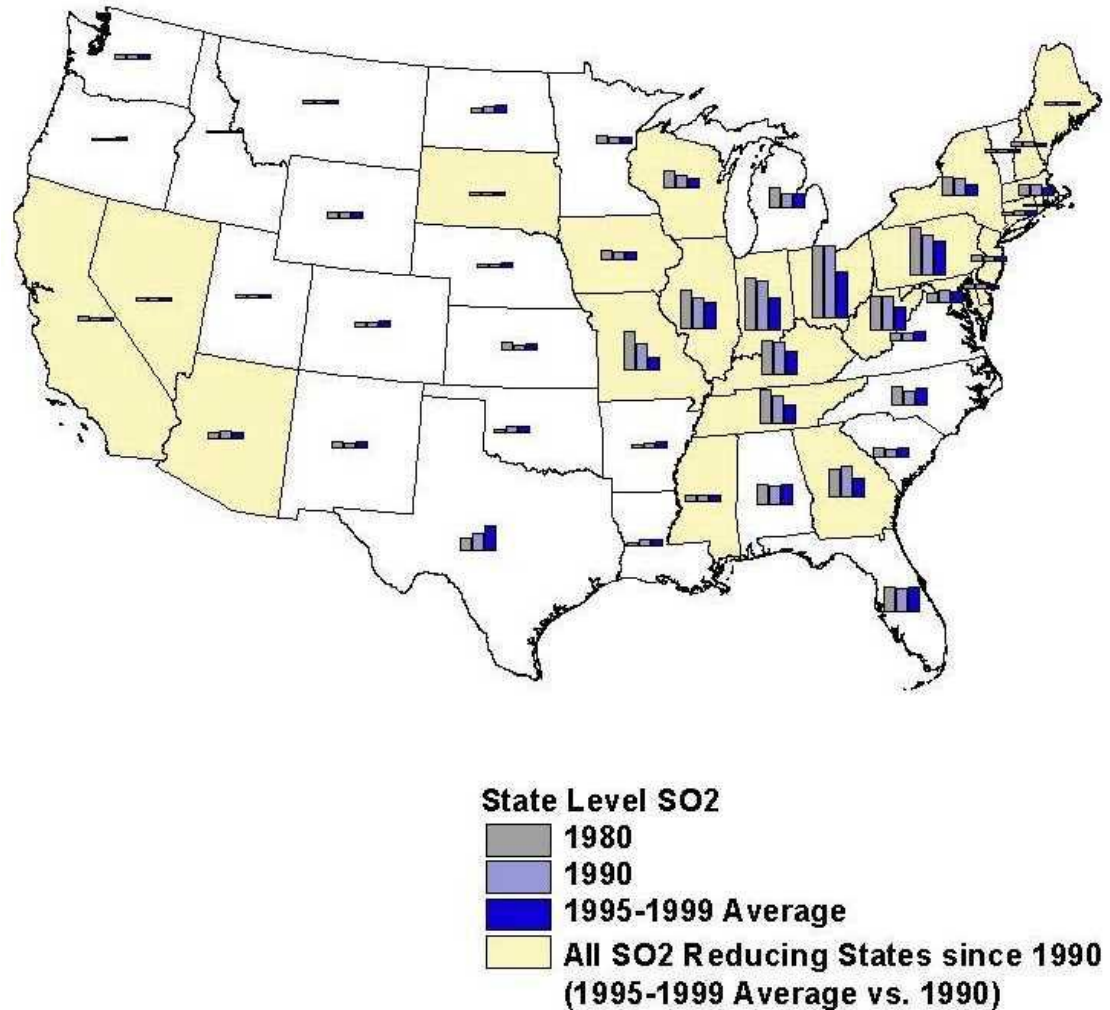
Acid Rain SO₂ Program Costs: Much Lower than Originally Predicted



Source: EPA, 2006

Spatial Issues (hotspots)

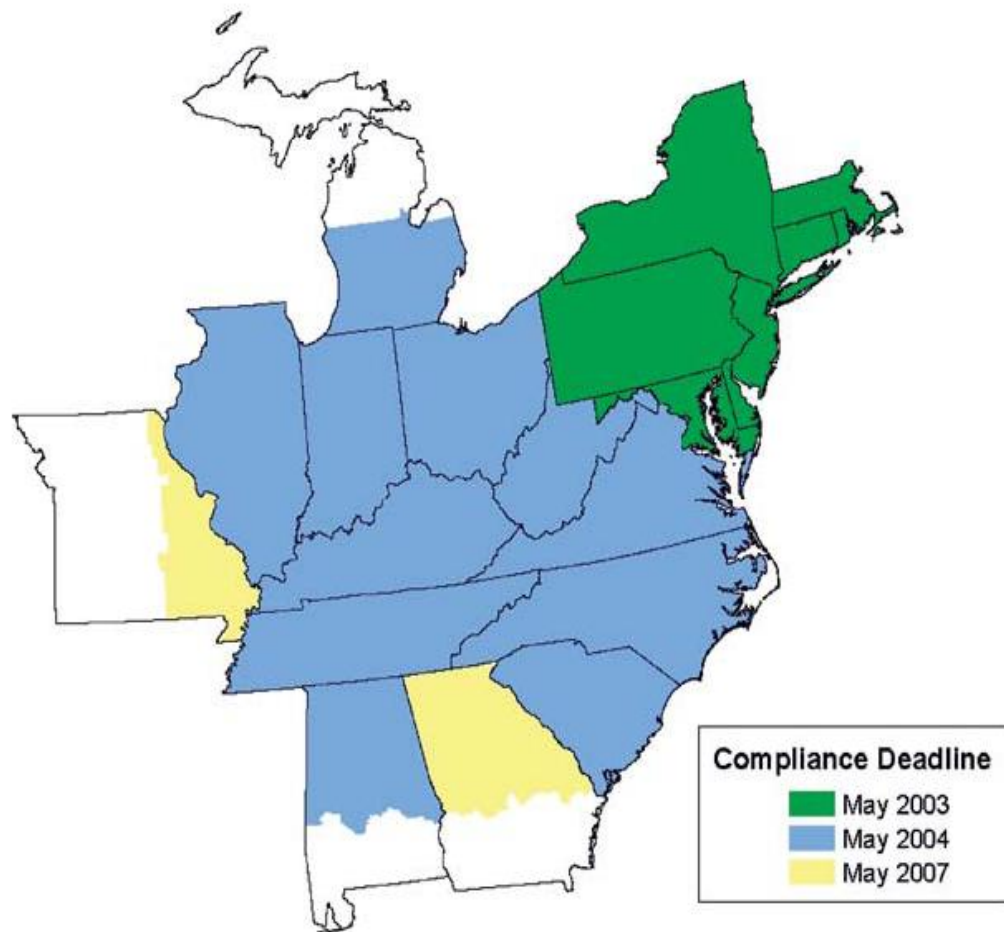
- Greatest reductions in States with highest emissions
- Independent analyses (i.e., ELI, RFF, and EDF) have found that trading under the Acid Rain Program has not created hot spots
- States and localities have authority to address local air quality problems (including setting facility permit levels that would preclude use of allowances)



NOx Trading Budget Trading Program: Addressing Ozone Transport

- Caused by local + transported emissions of NOx and VOC
- More diverse set of sources than acid rain
 - Power generation about 25% of NOx
- Seasonal problem with short term peak concentrations rather than total loadings

NOx Budget Trading Program (NBP)



- Problem: Reduce summer ozone/smog levels
- Scope: Eastern U.S.
- Target: Reduce NOx emissions from electric generators and industrial boilers by 1 million tons (70% below 1990 levels)
- Coverage: 2,570 units

NOx Budget Program Design Elements

- Timing:
 - Five-month compliance period: May 1 –September 30 ozone season
 - Finalized in 1998, monitoring required in 2002 and reductions in 2003
 - Court order moved compliance date for all states back to 2004
- Applicability
 - Fossil fuel fired electric generators > 25 MW
 - Industrial boilers and turbines >250 mmBtu/hr
- Allowance Distribution
 - EPA assigns emissions/allowance budgets to States
 - States allocate to sources (total allocations must be within state budget)
 - States may set aside a portion of the budget (renewables, new sources)
- Allowance Use
 - Allowance is defined as authorization to emit one ton of NOx during ozone season
 - Unrestricted trading can occur between sources
 - Progressive Flow Control if necessary
 - Requires portion of banked allowances to be surrendered 2:1 if needed to cover emissions

NOx Budget Program Design Elements

- Monitoring and Reporting Emissions
 - Sources required to continuously monitor emissions in accordance with Part 75
 - Updated Acid Rain Program monitoring regs
 - Additional guidelines:
 - Monitoring certification process
 - Data review
 - Quality assurance tests
 - Quarterly reporting
- Compliance and Enforcement
 - All sources must hold allowances sufficient to cover emissions
 - Compliance and overdraft accounts
 - Automatic excess emissions offset
 - 3 allowances for each ton of excess emissions
 - Other enforcement action possible

Summertime NO_x Emission Reductions

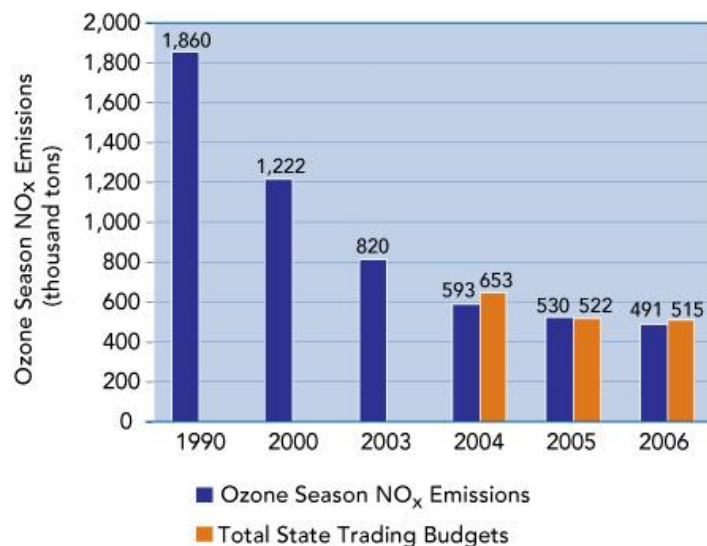
2006 NBP states' ozone season reductions (May 1 – September 30)

☹️ 74% from 1990 baseline

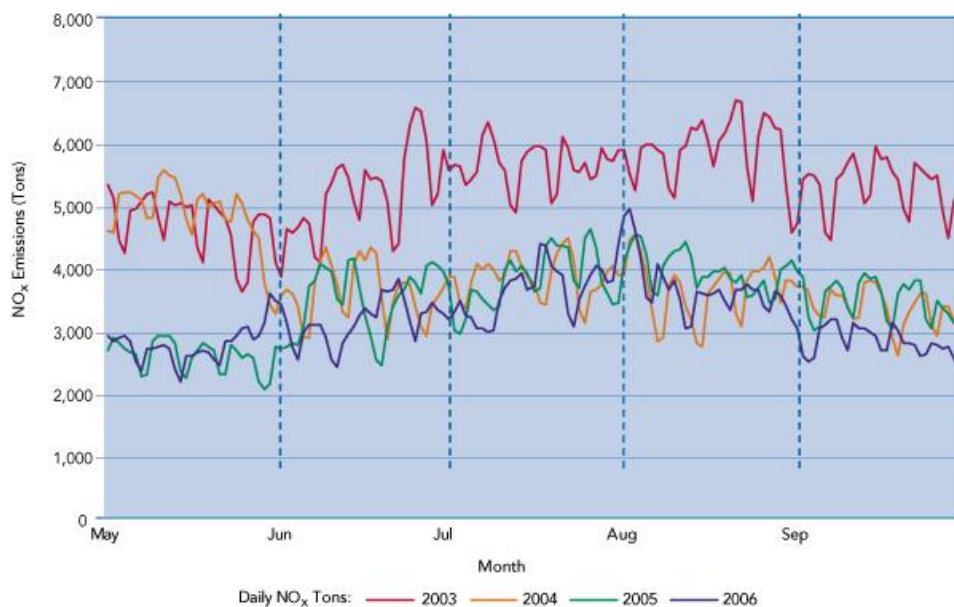
☹️ 60% from 2000 baseline

☹️ 7% from 2005

Ozone Season NO_x Emissions from All NBP Sources

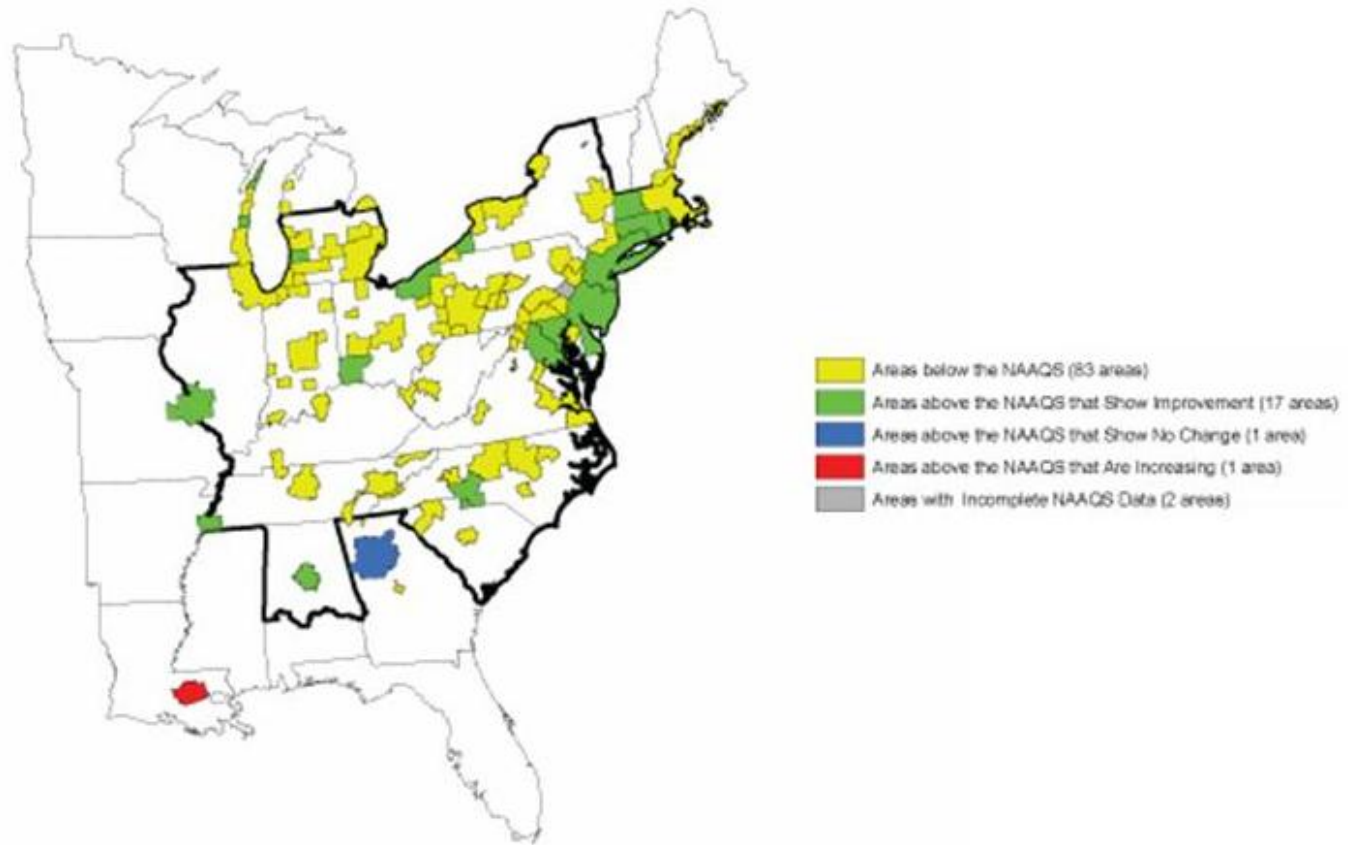


Comparison of Daily Ozone Season NO_x Emissions from NBP Sources, 2003–2006



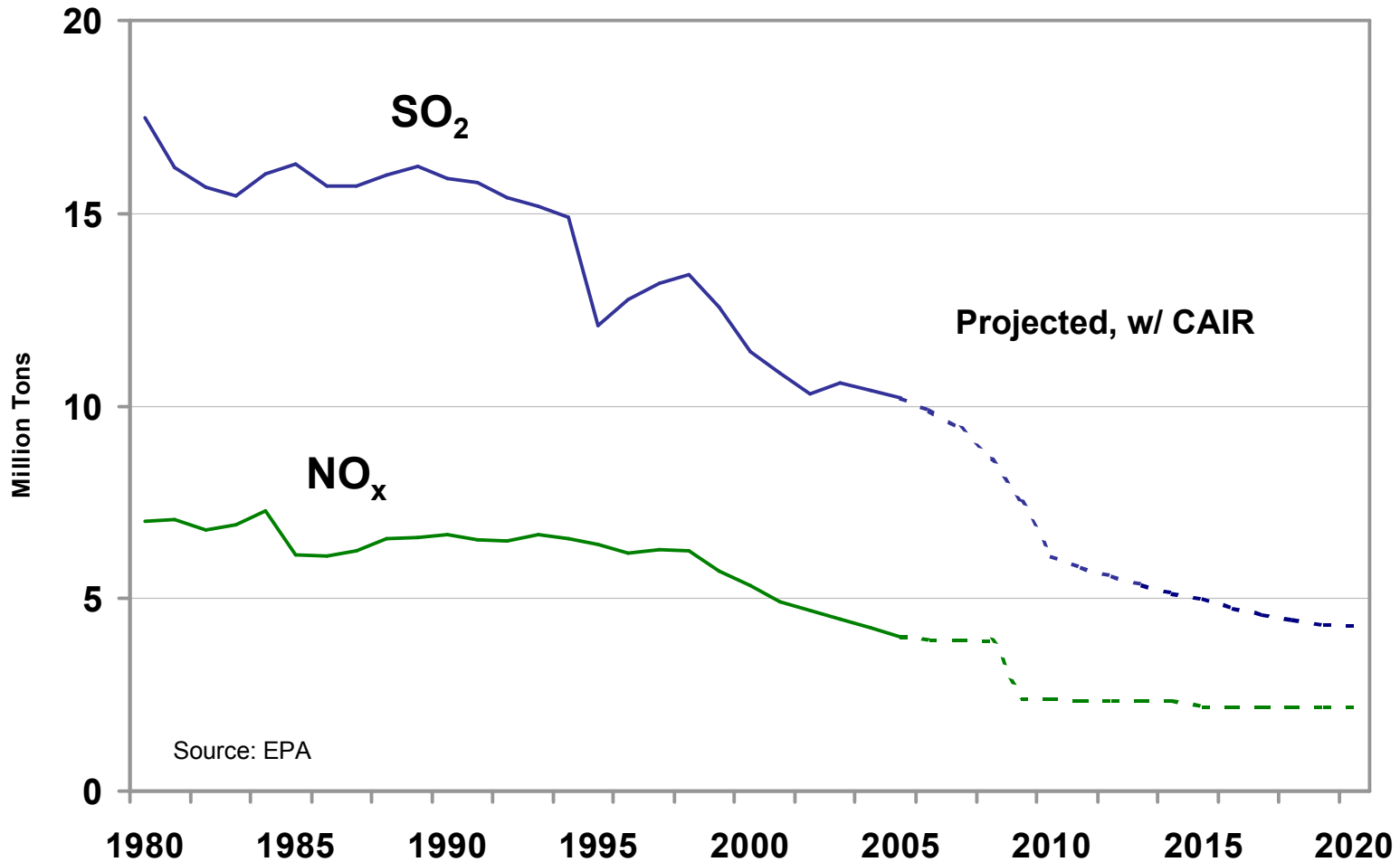
Source: EPA, 2006

80% of Areas in the Eastern US that Didn't Meet the Ozone Std in 2004 Now Have Better Air than the Std Requires



Changes in 8-hr ozone nonattainment areas in the East, 2001-2003 versus 2004-2006

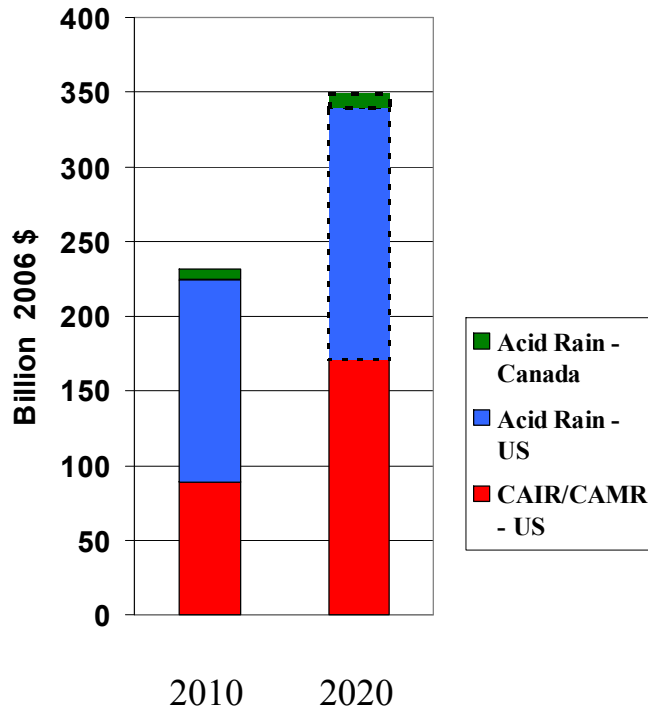
National SO₂ and NO_x Power Plant Emissions



Benefits of Acid Rain and CAIR Program

Annual Benefits

-Qualified Assessment-



Note: All estimates used a 3% discount rate. Use of 7% discount rate would lower estimates about 15 percent. CPI-U used to convert 1999\$ and 2000\$ to 2006\$. Sources: Used Chestnut & Mills Analysis, "A fresh look at the benefits and costs of the US acid rain program" (Oct. 1, 2004) for 2010 Acid Rain Benefits and EPA's Multi-pollutant Regulatory Analysis: CAIR, CAVR, CAMR (Oct. 2005) for 2010 and 2020 estimates for these programs. Acid Rain 2020 benefits extrapolated from 2010 estimates.

- Benefits driven by:
 - Reduced premature deaths
 - Lowering aggravation and incidence of heart and lung ailments
- Other benefits:
 - increased worker productivity
 - reduced absences from school and work
 - visibility improvement in some parks
- Benefits not included:
 - CAIR's Canadian Health Benefits
 - Acid rain environmental benefits
 - Mercury benefits
 - Remaining visibility benefits from parks and urban areas
 - Others

Basic Elements of Cap and Trade

- **Full sector coverage** – All sources (existing and new) included
 - Minimizes shifting of production and emissions (“leakage”)
 - Assures achievement of emission reduction goal without case-by-case review
 - Reduces administrative costs to government and industry
- **Cap on emissions** – Government issuance of a fixed quantity of allowances
 - Limits emissions to achieve and maintain environmental goal
 - Limits creation of “paper credits” and “anyway tons”
 - Provides certainty to allowance market
- **Monitoring** – Accurate measurement and reporting of all emissions
 - Assures accountability and results
 - Establishes integrity of allowances and confidence in the market
- **Trading** – Unrestricted trading and banking (with source-specific limits allowed to protect local air quality)
 - Allows companies to choose (and change) compliance options
 - Minimizes compliance cost
 - Ensures that trading will not cause “hotspots”

Emissions Measurement Goals

- Complete accounting with no underestimation
- Simplicity, consistency and transparency
- Incentives for accuracy and improvement
- Cost effectiveness
- Flexibility for small sources
 - 36% of units must use Continuous Emissions Monitors (CEMS)
 - Accounts for 96% of total SO₂ emissions
- Electronic reporting, feedback, and auditing
- Public access to data

Public Access to Hourly Emissions Data

Clean Air Markets - Data and Maps - Microsoft Internet Explorer

File Edit View Favorites Tools Help

U.S. Environmental Protection Agency

Clean Air Markets - Data and Maps

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[Clean Air Markets - Data and Maps](#) > [Create Queries with Emissions Data](#)

Create Queries

Time Frame: Unit Emissions Hourly Data

Start Date: 02/3/2002

End Date: 02/3/2002

Facilities: Coronado Generating Station

[New Query](#) [Print Report](#) [Download Data](#) [Report Definitions](#)

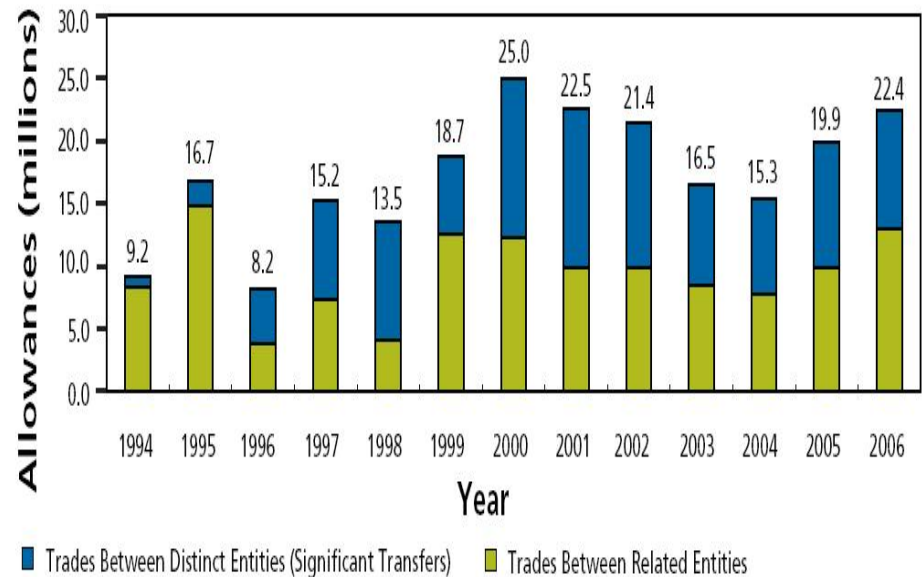
State	Facility Name	Facility ID (ORISPL)	Unit ID	Date (mm/dd/yyyy)	OP Hour	SO ₂ Tons	CO ₂ Tons	NO _x Tons	Avg. NO _x Rate (lb/mmBtu)	Heat Input (mmBtu)	OP Time (hrs)
AZ	Coronado Generating Station	6177	U1B	02/03/2002	00	62.1	58.9	184.2	0.32	574	1.00
AZ	Coronado Generating Station	6177	U1B	02/03/2002	01	42.3	59.0	184.5	0.32	575	1.00
AZ	Coronado Generating Station	6177	U1B	02/03/2002	02	33.4	59.7	186.8	0.32	582	1.00
AZ	Coronado Generating Station	6177	U1B	02/03/2002	03	18.4	59.7	186.6	0.32	581	1.00
AZ	Coronado Generating Station	6177	U1B	02/03/2002	04	30.0	59.8	187.2	0.32	583	1.00
AZ	Coronado Generating Station	6177	U1B	02/03/2002	05	34.0	59.5	186.0	0.32	580	1.00

Active Allowance Market

- Over 224 million* allowances privately transacted since 1994
- Approximately 42% of transfers are arms length trades
- Over 98% of transfers are handled online
- Low transaction costs

*excludes EPA transfers

SO₂ Allowances Transferred under the Acid Rain Program



Source: EPA, 2007

Public Access to Allowance Data

Internet query capability

Transaction Report - Netscape

File Edit View Go Communicator Help

Back Forward Reload Home Search Guide Print Security Stop

Bookmarks Location: <http://www.epa.gov/6709/atdcd/owa/ptctrl>

ATS - Transaction Report

Event Num	Transaction Description	Transferee ID	Transferee Name	State	Transferee Rep	Transferor ID
2134	Purchase at EPA Auction	999900000048	Cantor Fitzgerald Brokerage		Bartels Carlton	000000000000
2168	Private Transfer	999900000044	Cantor Fitzgerald Brokerage		Bartels Carlton	002835000000
2169	Private Transfer	999900000044	Cantor Fitzgerald Brokerage		Bartels Carlton	002835000000
2170	Private Transfer	999900000044	Cantor Fitzgerald Brokerage		Bartels Carlton	002835000001
2171	Private Transfer	999900000044	Cantor Fitzgerald Brokerage		Bartels Carlton	002835000001
2172	Private Transfer	999900000044	Cantor Fitzgerald Brokerage		Bartels Carlton	002836000001
2173	Private Transfer	999900000044	Cantor Fitzgerald Brokerage		Bartels Carlton	002837000000
2174	Private Transfer	999900000044	Cantor Fitzgerald Brokerage		Bartels Carlton	002838000001
2175	Private Transfer	999900000044	Cantor Fitzgerald Brokerage		Bartels Carlton	002049000000
2176	Private Transfer	999900000044	Cantor Fitzgerald Brokerage		Bartels Carlton	000026000000
2177	Private Transfer	999900000044	Cantor Fitzgerald Brokerage		Bartels Carlton	000703001BL
2178	Private Transfer	002836000011	Avon Lake	OH	Couch, Jr. Howard	999900000004

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Type of transfer
(auction, private)

Buyer name and
account info

Transaction Report - Netscape

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Bookmarks Location: <http://www.epa.gov/6709/atdcd/owa/ptctrl>

Transferor Name	State	Transferor Rep	Trans Total	Confirm Date	Allowance Year	Start Number	End Number	Amount
Auction Reserve		EPA Representative Authorized	2572	19930401	1995	10188	12759	2572
abula	OH	Couch, Jr. Howard	2317	19940330	2000	6022520	6024836	2317
abula	OH	Couch, Jr. Howard	1974	19940330	2000	6024837	6026810	1974
abula	OH	Couch, Jr. Howard	1779	19940330	2000	6026811	6028589	1779
abula	OH	Couch, Jr. Howard	1873	19940330	2000	6028590	6030462	1873
h Lake	OH	Couch, Jr. Howard	4984	19940330	2000	6035242	6040225	4984
ake	OH	Couch, Jr. Howard	6083	19940330	2000	6180865	6186947	6083
e Shore	OH	Couch, Jr. Howard	5990	19940330	2000	6413079	6419068	5990
Watson	MS	Guthrie Bill	5000	19940330	1995	2662137	2667136	5000
Gaston	AL	Guthrie Bill	5000	19940330	1995	369865	374864	5000
en	GA	Guthrie Bill	10000	19940330	1995	549329	559328	10000
or Fitzgerald Brokerage		Bartels Carlton	20000	19940330	1995	369865	374864	5000

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Seller name and
account info

Confirmation date,
serial numbers and
total allowances
transferred

Lesson: Government Focus

- Achieving the environmental goal
 - Reducing and capping emissions
 - With greater than 99% compliance
- Supporting the allowance market by
 - Providing certainty in allocations, rules, and consequences for noncompliance
 - Ensuring the integrity of the allowance, i.e., the authorization to emit
 - Providing transparency of data and decisions
 - Minimizing administrative costs for industry and government

For more information about OAP

- Office of Atmospheric Programs:
<http://www.epa.gov/air/oap.html>
- Clean Air Markets Division:
<http://www.epa.gov/airmarkets/>
- Climate Change Division:
<http://www.epa.gov/air/ccd.html>
- Climate Protection Partnership Division:
<http://www.epa.gov/cppd/>
- Stratospheric Protection Division:
<http://www.epa.gov/ozone/>

Emissions Trading in Ontario

- Presentation by:**

- John Hutchison
- Senior Policy Advisor
- Ministry of the Environment
- January 8, 2008**

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Outline of Presentation

- Emissions Trading Concept
- Advantages
- Ontario Context
- Intent of the Regulations
- Key Elements
- NOx and SO2 Limits
- Credits
- Cross Border Component

Emissions Trading – The Concept

- Specified emitters of a pollutant (e.g., NO_x) have emission limits imposed on them (caps).
- Allowances (i.e., permits) are issued to them (gratis in Ontario) equal in tonnage to their limits, according to a formula or some negotiated distribution method.
- Emitters may trade permits among each other, or with anyone.
- Emitters having low abatement costs may over-comply, and sell any surplus permits to other emitters enabling them to maintain or expand production.
- Emitters with high abatement costs may prefer to buy surplus permits if the cost of doing so is less than the cost of abatement.
- The total number of permits falls over time, increasing the environmental benefit, and causing permit prices to rise, all else being equal.
- At some point an emitter that has been buying surplus permits may choose to invest in abatement when the cost of doing so is less than the cost of continuing to buy permits.

Advantages of Trading

- Flexibility
 - Capped emitters are able to tailor their emissions compliance strategies to complement, rather than conflict with, their business planning processes, eliminating sub-optimal/premature investments.
- Air quality improvement
 - Total emissions in the air shed are reduced to the target level – it doesn't matter who makes reductions as long as the requisite aggregate number of reductions are made.
- Lowest cost solution
 - Emitters having the lowest marginal abatement costs will invest in abatement; and, they will be motivated to over-comply, know they can sell their resulting surplus permits.
 - Other emitters will eventually invest in abatement as the cost of doing so becomes “worth it”.
 - Uncapped (unregulated) emitters will be similarly motivated.

Context of Ontario's System

- Emissions Reduction Trading (ERT) is a key component of Ontario's plan to reduce emissions of two of the most significant smog-causing pollutants, NO_x and SO₂, from the industrial and electricity sectors.
- This is one measure within the context of a wider Provincial commitment to reduce total NO_x emissions 45% from 1990 levels, and SO₂ by 50%.
- Regulation 397/01, Emissions Trading, came into effect on December 31, 2001.
 - Applied initially to 5 coal-fired facilities and 1 oil/natural gas-fired facility operated by Ontario Power Generation (OPG).
 - Applied to remainder of the combustion-based electricity generation facilities starting January 1, 2004:
 - Having a minimum capacity of 25 MW
 - Producing a minimum of 20,000 MWh per year
 - Emitting more than trace amounts of NO_x or SO₂

Context (cont'd)

- Regulation 194/05 published in the Ontario Gazette on May 21, 2005.
 - O. Reg. 194/05 -Industry Emissions: Nitrogen Oxides and Sulphur Dioxide
 - O. Reg. 193/05, amended O. Reg. 397/01 – Emissions Trading
 - Metric changed from NO to NO_x (as NO₂)

For regulations 397 and 194, go to:

http://www.oetr.on.ca/oetr/about_registry.jsp

Intent of Reg 397

- To reduce emissions of nitrogen oxides (NO_x) and sulphur dioxide (SO₂) in the electricity sector, and to provide for emissions trading.
- Allowing emissions sources to trade can reduce the cost to society of meeting tougher emissions regulations.
- Emissions trading systems in which facilities from uncapped sectors can also participate may spur innovation and competitiveness in those sectors.
- Managed well, an allowance and credit trading program should achieve the same air quality improvements as command and control systems (or cap and trade systems), but at lower overall costs.
- Emissions trading does not protect air quality.
 - Emissions limits protect air quality.

Key Elements

- **Sector Limits (Cap)** - O. Reg. 397 sets NOx and SO2 emission caps for fossil-fuel fired electricity sector while O. Reg. 194 sets caps for seven industrial sub-sectors. The cap equals the number of allowances issued each year. Limits diminish over time.
- **Variable Mitigation Costs** - Significant variation in costs of emissions prevention and control among companies and industries
- **Allowances (Permits)** - allocated to electricity sector (in units of tonnes, each having unique identifier number) according to anticipated electricity production (rewarding more efficient generators). Industry allocations based on past production.
- **Flexibility and Economic Efficiency** – Trading provides economic incentives for those with lower emissions, and also flexibility in achieving emission reduction objectives (i.e., most cost effective means).
- **Credit Creation** – un-capped emitters can earn emissions reduction credits for projects which are consistent with an approved “Standard Method” (real, verifiable, quantifiable, unique, surplus); in tonnes, each with unique serial number.
- **Banking** – Indefinitely for allowances and credits

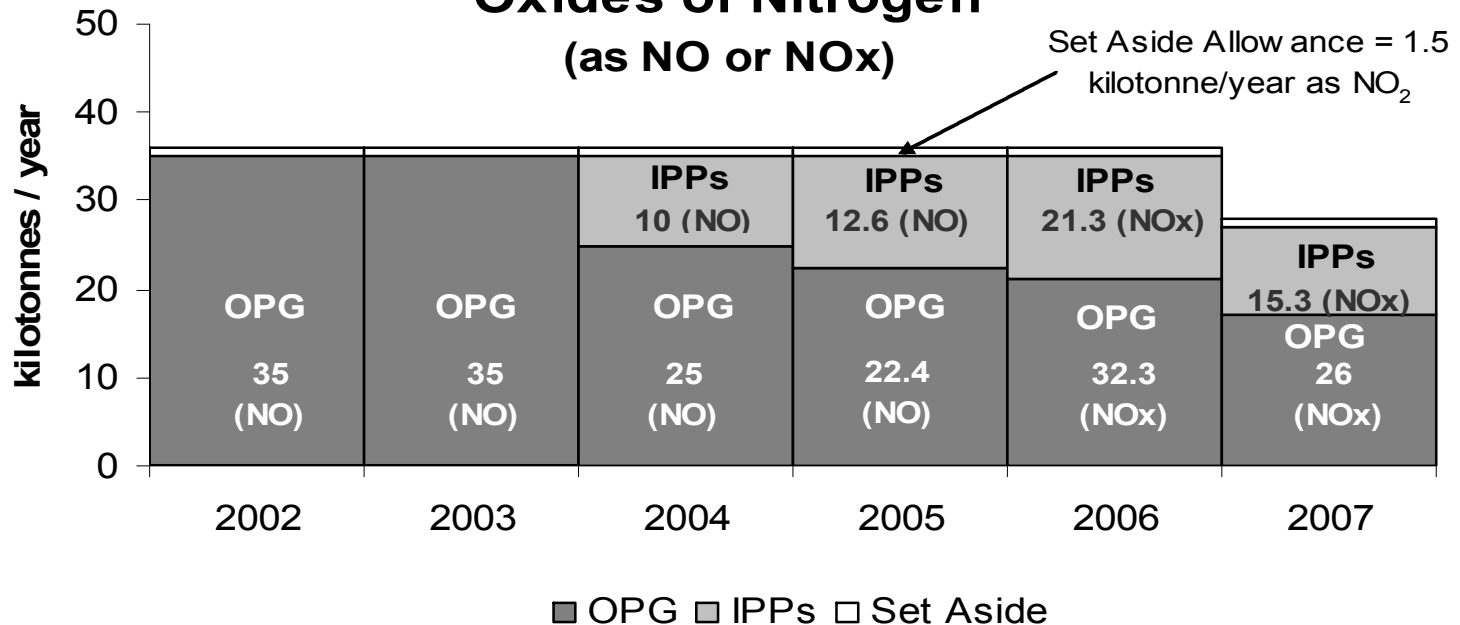
Key Elements (cont'd)

- **Trading** - Facilities can use emissions trading to meet compliance obligations.
 - Allowances are transferable among capped sectors including the newly-capped industrial sectors covered by Reg. 194/05.
 - Allowances and credits can be used by capped sectors to meet obligations. (Some limits on credit use.)
- **Annual 'Set-Aside'** - some NOx/SO2 allowances are reserved for renewable and energy conservation projects
- **New Industry Sources** - Receive allowances from new source set-aside pool – Must demonstrate BACTEA
- **Monitoring** – CEMS are required, or an estimation method that is at least as accurate. 194 specifies sources requiring CEMS.
- **Compliance** - annual balancing (true-up) of monitored emissions through the retirement of allowances/credits is mandatory
- **Registry** - plays a central role in program transparency and provides tracking for all aspects of allowances and credits from creation to retirement (www.oetr.on.ca)

Reg 397 - NO_x

Power Sector Limits (i.e. Caps)

Oxides of Nitrogen (as NO or NO_x)



Regulated Facilities:

IPPs – Independent Power Producers

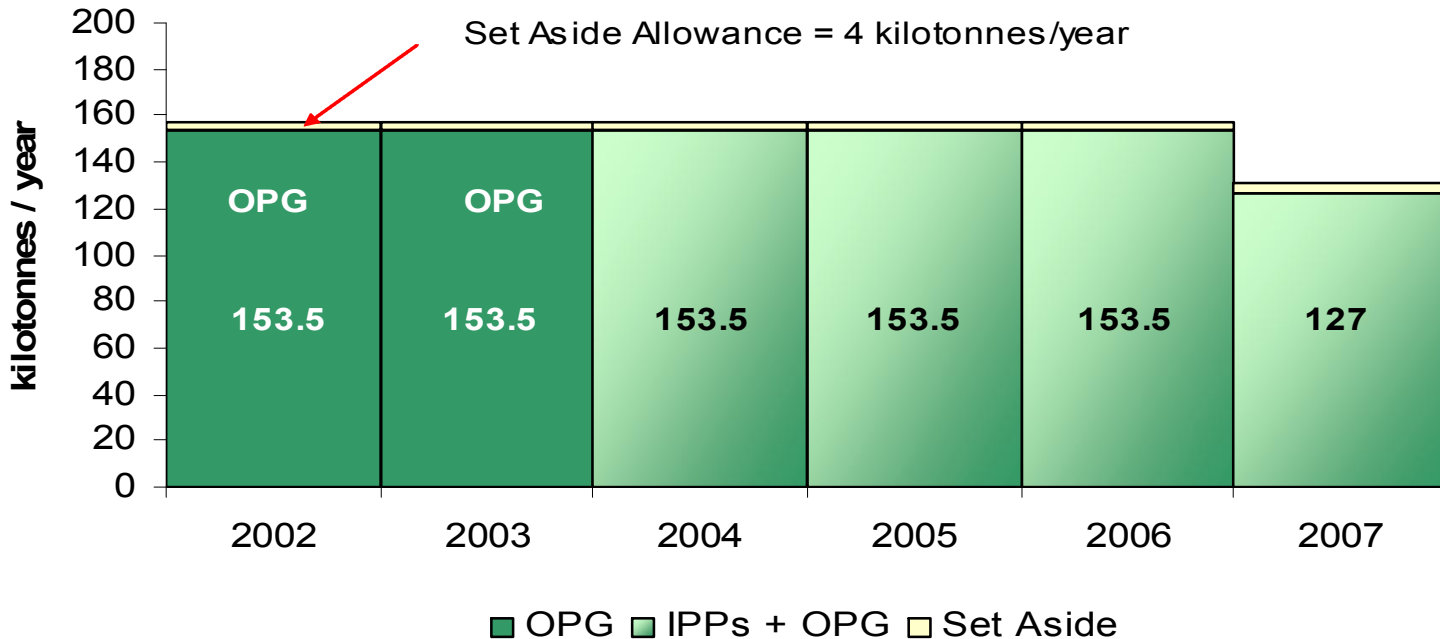
OPG – Atikokan, Lakeview, Lambton, Lennox, Nanticoke and Thunder Bay

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Reg 397 – SO₂

Ontario Sulphur Dioxide (SO₂) Power Sector Limits



Regulated Facilities:

IPPs – Independent Power Producers

OPG – Atikokan, Lakeview, Lambton, Lennox, Nanticoke and Thunder Bay

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Reg 194 - Sector Budgets - NOx

Sector	Sector Budgets (kilotonnes)					
	2006	2007	2008	2009	2010-14	2015+
Petroleum*	12.2	12.2	11.3	10.4	10.4	10.4
Iron & Steel	10.8	10.4	10.4	10.4	9.9	9.9
Pulp & Paper	7.2	6.8	6.8	6.8	6.6	6.6
Glass	2.1	2.0	2.0	2.0	1.8	1.8
Cement	19.9	19.1	19.1	19.1	17.8	14.9
NSSA	2.2	2.2	3.0	3.1	3.1	3.1
TOTALS	54.3	52.6	52.6	51.8	49.5	46.6

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Reg 194 - Sector Budgets – SO₂

Sector	Sector Budgets (kilotonnes)					
	2006	2007	2008	2009	2010-14	2015+
Petroleum*	56.4	56.5	46.1	35.9	35.9	35.9
Iron & Steel	18.6	18.7	18.7	18.7	19.4	19.4
Pulp & Paper	10.3	9.3	9.3	9.3	8.3	8.3
Cement	22.3	21.8	21.8	21.8	20.8	16.1
Carbon Black	11.1	10.9	10.9	10.9	10.7	10.7
Base Metals	331	241	241	241	241	91
NSSA	9.8	10.1	10.1	10.1	10.1	10.1
TOTALS	459.6	368.2	357.9	347.6	346.2	191.5

** Not a sector budget; total allocations and budget for Nova*

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Credits

- Ontario has a “cap, credit and trade” system; not “cap and trade”
- Credits
 - provide compliance flexibility and liquidity for the small Ontario emissions trading market
 - incentive to be clean – revenue from credit sales rewards reductions/discourages emissions among uncapped emitters
 - includes mobile sources – e.g., heavy engine idling
 - 10% gift to the environment ensures credit use leads to environmental benefits
- Philosophy: encourages uncapped sector participation in emission reduction projects; helps provide a more liquid market.
- Rigour: emission reductions must be real, unique, surplus, quantifiable and verifiable.

Credits (cont'd)

- *ERCs can be Harvested* – up to 7 years from project completion
- *Credits can be Banked* – indefinitely
- *Limited Credit Use* – for annual compliance, retired credits can not be more than 33% of NOx and 10% of SO2 allowances retired.
- *Credit Use Benefits Environment* – retirement for compliance triggers a 10% “gift to the environment”
- *Ozone Season* – credits created outside of the ozone season can only be used to offset non-ozone season emissions
- *Only generated by emitters* who are not awarded allowances
- *Rate-based* – facility shutdowns don’t count; rates must improve
- *Regulatory Process:*
 - Pre-approved Standard Method
 - Protocol, Emission Reduction Reports, Independent Verification
 - Public Review and Comment Required
 - Review and Approval of Credit Creation

Cross Border Component

Two Mechanisms:

1. US Allowances

- U.S. EPA NOx Allowance and Acid Rain (SO₂) Trading Programs
- retired by an Ontario capped emitter unused in the US; then equivalent tonnage approved as credits for use in Ontario
- A source of last resort (because of cost)
- Subject to the same retirement requirements as credits

2. Ontario Credits Based on US Emissions Reductions

- *Eligibility Zone* (12 US states & D.C.)
 - same process as Ontario credits from the US
 - Participating emitters do not participate in U.S. EPA Trading Programs (but may have local regulatory limits)
- *Beyond the Eligibility Zone*
 - above; plus must demonstrate a measurable air quality improvement in Ontario – a difficult hurdle

Credit Creation Eligibility Zone

Ontario Credits Eligibility Zone



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U.S. Experience with Emissions Trading: Lessons for CO₂ Emissions Trading

A. Denny Ellerman

Joint Program on the Science and Policy of Global Change
Massachusetts Institute of Technology

Cap and Trade Design Issues in Depth
NAF/Pew Center/WRI Webinar
January 8, 2008





Working Together...
Because Climate Change is Serious Business.



Emissions Trading in the U.S.: Experience, Lessons, and Considerations for Greenhouse Gases

Denny Ellerman, Paul L. Joskow, and
David Harrison, Jr.

http://www.pewclimate.org/global-warming-in-depth/all_reports/emissions_trading/

<http://web.mit.edu/ceepr/www/R2003-169.pdf>

The Lessons

- Emissions Trading Works
- Clearly defined rights are key
- Allocation doesn't affect performance
- Banking/borrowing help
- Offsets and linking are important design features

Emissions Trading Works

- Markets emerge and firms trade
- The cost savings are substantial ($\approx 50\%$)
- The environmental performance is better than command-and-control (CAC)
 - Once decided, relatively quick implementation
 - A simple requirement and an unavoidable price
 - Facilitates strict accountability and avoids selective relaxation
- But avoid “market window-dressing”: Chicago VOC

The Key: The Right to Emit

- Operates through clearly defined and strictly enforced emissions rights
- Recognizes that the regulator doesn't have the information to regulate efficiently or effectively
- Regulator focuses on the cap, the rules of the market, measuring, reporting, and enforcement
- Can then let the market distribute the allowances appropriately to achieve efficiency
- But...must be willing to accept market outcomes

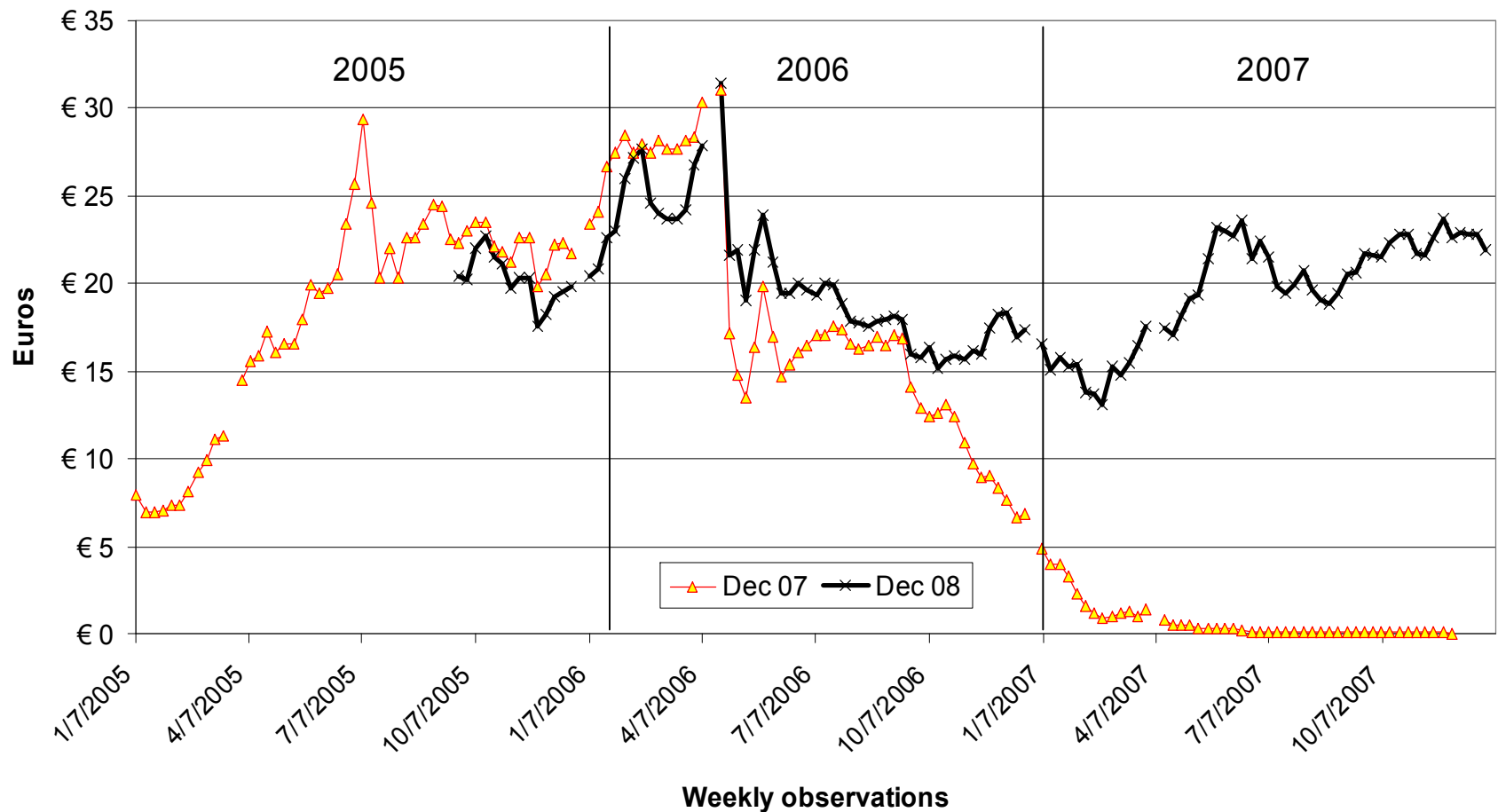
Allocation

- More controversial for CO₂ than for SO₂ or NO_x
- No evidence that allocation has affected program performance
- Underlying issue is how to use value created by the permits
 - Free allocation: Typically shareholders of affected firms
 - Auctioning: The government for other uses (reduce taxes, R&D, DSM, transition assistance, etc.)
- Essentially a political debate
- All existing systems have a high degree of free allocation
 - Emerging consensus to phase out over time

Banking/Borrowing

- When allowed, this feature has tended to dampen price fluctuations
 - Borrowing and the “safety valve” alternative
 - Banking provides a form of “early action” for phased-in programs
- No reason not to adopt for global stock pollutant
- EU ETS is providing most recent example of the value of banking/borrowing effects

The Effects of a Banking Restriction: The EU ETS



Offsets and Linking

- An always problematic issue
- Economic arguments favor offsets, but transaction costs limit their applicability
- Strategic arguments in a GHG program
 - Means of developing trading institutions in developing world
 - Paving the way for a more comprehensive system
- Additionality tests must be and can be met
- Need pragmatic, open, and rigorous provisions

Conclusion

- Available experience provides no reason not to rely on cap-and-trade mechanisms
- Design issues can be mastered
- Allocation has become the big issue, potentially complicating progress
- Are regulators ready to focus on emission reduction alone and let markets work?